NUMBER SERIES

Directions to Solve

In each series, look for the degree and direction of change between the numbers. In other words, do the numbers increase or decrease, and by how much.

Arithmetic Progression(AP)

Arithmetic progression(AP) or arithmetic sequence is a sequence of numbers in which each term after the first is obtained by adding a constant, d to the preceding term. The constant d is called common difference.

An arithmetic progression can be given
by $a,(a+d),(a+2d),(a+3d),\cdots a,(a+d),(a+2d),(a+3d),\cdots$
where aa = first term, dd = common difference
If a,b,ca,b,c are in AP,
$2b=a+c2b=a+c$

Number of Terms of an Arithmetic Progression

$n=(l-a)d+1n=(l-a)d+1$

where nn = number of terms, aa = the first term, ll = last term, dd = common difference

Sum of First n Terms of an Arithmetic Progression
$Sn=n2[2a+(n-1)d]=n2(a+l)Sn=n2[2a+(n-1)d]=n2(a+l)$

where aa = the first term,
dd = common difference,
$l=tn=nthl=tn=nth\ term\ =a+(n-1)d=a+(n-1)d$

Arithmetic Mean

If a,b,ca,b,c are in AP, bb is the Arithmetic Mean (AM) between aa and c.c. In this case, b=12(a+c)b=12(a+c)
Arithmetic Mean (AM) between two numbers aa and bb =12(a+b)=12(a+b)

If a,a1,a2⋯an,ba,a1,a2⋯an,b are in AP, then a1,a2⋯ana1,a2⋯an are the nn arithmetic means between aa and bb

Additional Notes on AP

i. To solve most of the problems related to AP, the terms can be conveniently taken as
   33 terms: (a−d),a,(a+d)(a−d),a,(a+d)
   44 terms: (a−3d),(a−d),(a+d),(a+3d)(a−3d),(a−d),(a+d),(a+3d)
   55 terms: (a−2d),(a−d),a,(a+d),(a+2d)(a−2d),(a−d),a,(a+d),(a+2d)
ii. tn=Sn−Sn−1tn=Sn−Sn−1
iii. If each term of an AP is increased, decreased, multiplied or divided by the same non-zero constant, the resulting sequence also will be in AP.

iv. In an AP, sum of terms equidistant from beginning and end will be constant.